Introduction to the Industrial Automation

Abstract: Automation can be, classified as High cost Automation and Low Cost Automation. For rapid industrial growth in developing countries, which is basically a NUCLEUS OF small industries, it is the primary importance to put the wheels of efficiency of these small industries properly geared to accelerate productivity, to increase profitability and to build a sound economy of the country. The proper tool to achieve this goal at present juncture is LOW COST AUTOMATION as high cost automation is not within the reach of the developing countries.

Keywords: low cost automation; automation; nucleus.

CONCEPT OF LOW COST AUTOMATION:

The Low Cost Automation Techniques is still quite new in the developing countries.
This technology has been in practice for last two to three decades in the developed countries, and had helped in boosting the economy of these countries very considerably.
A Thorough understanding of the concept of Low Cost Automation is the need of the hour for the successful implementation of this new technology. The Manager of small industry normally will have not time even to think of investigating the possibility of applying new techniques to increase productivity since the type of work executed in his industry would be of orthodox nature. Perhaps, sometimes he is satisfied in going pamphlets, superficially. Thus even some simple and cheap ideas shown in the magazines to increase productivity will be slipped from sighting. Added to this many industrialists are under the wrong notion that Automation is very expensive adventure and can be

utilized only by mass production industries that have adequate capital investment and can afford to employ highly qualified specialists.

DEFINITION OF LOW COST AUTOMATION:

The various benefits enumerated could be achieved by Low Cost Automation through several avenues. In fact, the purpose of Automation is to relieve man of routine tasks so that he can exercise his proper function of making decision. This can be done by introducing very simple devices such as limit switches, electrical relays, solenoid valves, pneumatic, and hydraulic actuators. Hence, the used simple devices utilizing relatively cheap and readily available components to minimize or eliminate human efforts in certain operation are called Low Cost Automation.

AVENUES FOR ACHIEVING AUTOMATION

- Limit switches
- Electrical relays
- Solenoid valves
- Pneumatic actuators
- Hydraulic actuators
- Fluidic devices
- Mechanization

APPLICATION OF LCA TECHNIQUES

Through the various, Avenues the LCA applications have increased the productivity, ensuring quality, consistency of product and saving in operating &production cost, and reduction in process cost.

MORE RELIABLE DELIVERY (CUSTOMERS SERVICES)

BETTER MANAGEMENT CONTROL AND SAVING IN LABOUR COST

1. Reduction in production cost. Saving of 20 to 25% over conventional method in lieu Automation

2. Saving in operating cost. About 40% less manual cost due to saving in labour. Also less maintenance & hence better efficiency
3. Not only confirmed to industries but also in agriculture, medicine cottage industries, banning &textiles etc.
4. Significant reduction in process in process cost & increase in output.
5. Remarkable improvement, in quality greater consistency of production and reduction in space.

HURDLES IN THE INTRODUCTION TO LCA TECHNIQUES

The vital draw back in the introduction of LCA techniques in small industries can be summarized as under:

1. Misunderstanding of the purpose of objective of automation.
2. Insufficient knowledge of automation techniques
3. Inaccurate assessment of financial returns on capital investment.
4. Comparative cheapness of labour in the country compared to Western countries and hence no great incentives to replace it.

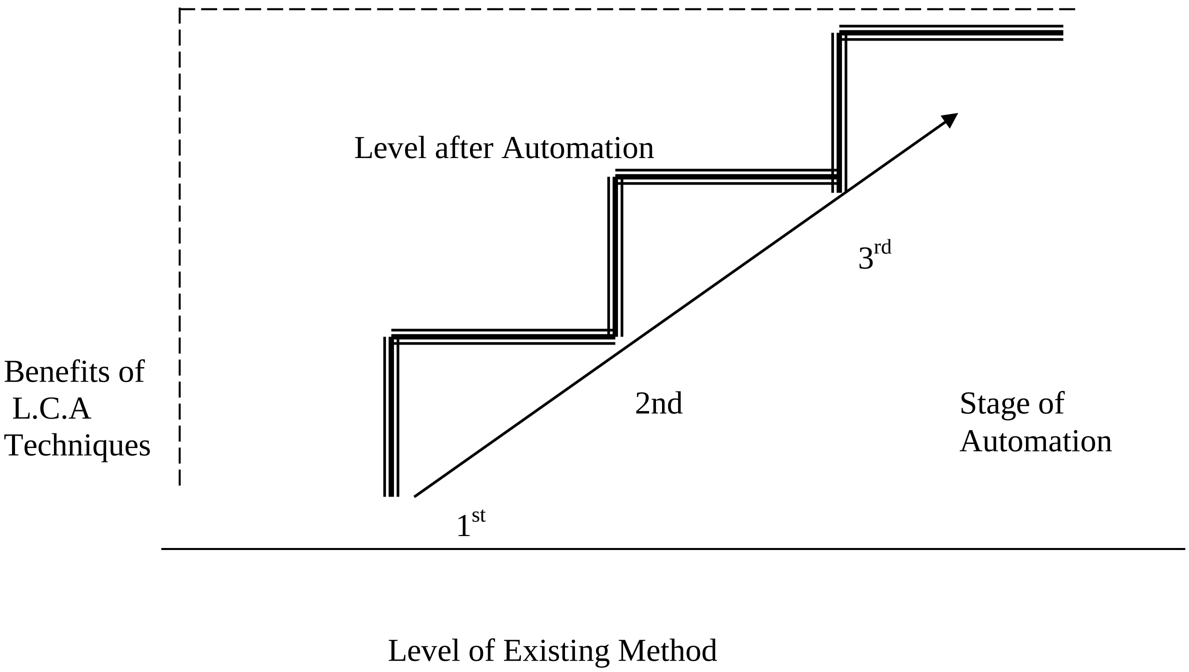
BENEFITS OF LCA TECHNIQUES

- The hurdles in the introduction of LCA Techniques could be overcome only after a clear understanding of the benefits of Low Cost Automation. The main objective of LCA Techniques is to improve methods of performance and efficiency coupled with replacement of manually operated devices by pneumatic Actuators. Also to deploy labour to the best advantage, to reduce physical effort of operators, to achieve reduction in production time and to effect saving of operating cost.
- Reduce Physical effort of operator.
- Increase output.
- Replaces manually operated devices by pneumatic actuators.

- Operators can control several machines when numbers of machines perform several functions automatically in sequence.
- Reduce the wastage of material.
- Reduces Human Error.
- Deploys labour for the best advantage.

LCA TECHNIQUES IN INDUSTRIES:

Before implementation LCA Techniques, it is very important to ensure staff acceptance of newer techniques, to ensure financial viability to ensure the improvement over the present method through ‘work study’ Techniques and more than all to ensure sense of job satisfaction (if not frustration and disillusionment will result at all levels in the organization). Then only LCA Techniques to be implemented “step by step” to make sure the financial returns on capital investment at every stage of Automation. In fact to effect less financial investment at every stage of Automation In fact to effect less financial investment at every stage of Automation, LCA techniques are introduced with few simple Automation devices in an existing plant to save labour cost, to increase output to reduce physical effort of operator to achieve better quality of product and to ensure better productivity profitability.



POTENTIAL SAVING BY LCA TECHNIQUES:

Automation into the existing plant consideration must be given to such factors as savings in labour increased Output, Important in Quality and reduction in space.

(a) Saving in Labour:

It is easy to give a precise value of the cost of an operative if an automatic device replaces that operated plant or machine can readily be determined. In a small industry, many of the reiterative operations of a human being can often be replaced labour and sometimes even physically handicapped and mentally retarded personnel is often well worthwhile and may be the primary motive of Automation.

(b) Improvement in Quality:

The introduction of some of the automatic inspection devices can affect considerable savings. Obviously devices which can automatically check whether the production are upto standard rejections if any, may well show a substantial saving by for instance, replacing manual inspection. In engineering production, the cost of introducing automatic devices to gauge the dimensions of a component are reflected before they reach the assembly operations, Further such inspection devices can reveal at any early stage any progressive failure of a machine to produce the required product . Consequently it can be read jested before faulty products are fabricated.

(c) Reduction in space:

The total place occupied by a process plant depends partly on the volumetric requirements of the plant itself and partly on the volumetric requirements of the plant itself and partly upon the space required for accessibility. In most cases an automated plant will occupy considerably Less floor space than a manually controlled one because accessibility need not be taken into account to anything like the extent. Certain

accessibility is always required for maintenance but the various sensors controller and actuators involved can be located in relatively and actuators involved can be located in relatively inconvenient positions since there is no need for accessibility by the operations. Another important factor in evaluating the saving the which can be effected by reduction in space is that in an automated plant no space need he allowed for usual dumping of products.

(d) Increased output

A very simple type of production process is one in which a number of operations are performed sequentially, each starting on completion of the previous one. This type of production procedure is common both in engineering and in processing viz., chemicals, foods, so on

1) There is no accumulation of dead time and setting up times

2) Labour may not be available to run a manual plant on overtime, double and triple shifts.

3) The quality of supervision on shift work varies greatly. It is common experience that night shifts output is well down on day shifts owing to inferior night supervision.

Taking all these factors into account an automated plant may often yield at least twice the effective maximum output of the equivalent manual plant.

CONCLUSIONS:

Nevertheless the use of modern management methods is of immense value in improving the productivity while it must never to regard as an end itself, the use of scientific management tools must be encouraged. Hence a good understanding of the concept of low cost automation technique is very essential. The application of L.C.A particularly in small industries with th usage of simple device like limit switches ,relay sensors , actuators of pneumatic & hydraulic including electrical control to the existing machines and labour oriented operations will make them automatic at low cost to yield higher productivity and profitability for stability and growth in building up of national economies of the developing countries.